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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/553,490	06/16/2006	Stephen David Pollington	AA 1649 US	1298

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EXAMINER	
PATEL, SMITA S	
ART UNIT	PAPER NUMBER
1732	
MAIL DATE	DELIVERY MODE
03/02/2011	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/553,490	POLLINGTON ET AL.	
	Examiner	Art Unit	
	SMITA PATEL	1732	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 January 2011*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *43-54 and 56-58* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *43-54 and 56-58* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *01/21/2011*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. A request for continued examination under 37 CFR 1.114 filed on January 21, 2011 has been entered.

2. Claims 43-54 and 56-58 are pending. Applicant has cancelled Claims 1-42 and 55 and added new Claims 56-58.

Continued Examination Under 37 CFR 1.114

3. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after allowance or after an Office action under *Ex Parte Quayle*, 25 USPQ 74, 453 O.G. 213 (Comm'r Pat. 1935). Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on 01/21/2011 has been entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. **Claims 43-47, 49 and 56-58** are rejected under 35 U.S.C. 103(a) as being unpatentable over Matros (US Patent No.:6,314,722 B1) as evidenced by (NPL:

"The role of acid sites in cobalt zeolite catalysts for selective catalytic reduction of NOx", by Miller et al, Catalysis Leners 51 (1998) pages 15-22).

As per Claims 43 and 44, Matros teaches method and apparatus for emission control where the adjusting of the C1 hydrocarbon: nitrogen oxides (C1 HC:NOx) ratio of the exhaust gas is greater than 1.0 (Col.5 lines 56-63 and Col.7 lines 35-57) and the contacting the gas mixture from adjusting step with catalyst consisting of zeolites and tungsten doped titania (Col.4 lines 64-65). Further since the same catalyst are used as those in claimed such as zeolites and tungsten doped titania, it must be assumed that NO_2 contained in the nitrogen oxide containing exhaust gas is reduced to NO and further is supported by the evidence in (NPL: "The role of acid sites in cobalt zeolite catalysts for selective catalytic reduction of NOx", by Miller et al, Catalysis Leners 51 (1998) pages 15-22). Matros does not expressively mention passing the effluent gas from the contacting step to atmosphere but since Matros does discuss passing the effluent gas from the contacting step, it would have been obvious that treated gas is passed into the atmosphere to provide method for purifying exhaust gases from a lean-burn engine with catalyst selective for NOx reduction as taught by Matros.

As per Claim 45, Matros teaches step of adjusting the ratio of C1 hydrocarbon to NOx carried out at a temperature range for individual possible catalyst which encompasses or overlaps with claimed range of about 250-500º C (Col.4 lines 55 to Col.5 line 9).

As per Claim 46 and 58, Matros teaches particulate refractory oxide comprises a zeolite selected from the group of ZSM-5, Y-zeolite (Col.4 lines 62-66).

As per Claim 47, Matros teaches catalyst bed temperatures, quantity of NO2 in the exhaust gas and the rate of exhaust mass flow (Col.7 lines 59-67).

As per Claim 49, Matros teaches injecting a reductant into the exhaust gas.

As per Claims 56-57, Matros teaches the use of diesel fuel as hydrocarbon (Col.5 lines 25-30).

5. **Claim 48** is rejected under 35 U.S.C. 103(a) as being unpatentable over Matros (US Patent No.:6,314,722 B1) as evidenced by (NPL: "The role of acid sites in cobalt zeolite catalysts for selective catalytic reduction of NOx", by Miller et al, Catalysis Leners 51 (1998) pages 15-22) in view of Roth et al (WO 01/63104 A1).

As per Claim 48, Matros teaches the apparatus for emission control where it includes the process but does not expressively mention stored look up tables or the engine map in the response to the at least one input.

However, Roth describes system for reducing NOx transient emission where the adjusting the C1 hydrocarbon to NOx ratio is greater than 0.5(page 17 line 12) and operate red according to stored look up tables or engine map in response to the at least one input (page 7 line 8-10, page 30 lines 11-15).

It would have been obvious to combine the teaching of Matros with Roth to include the look up tables or engine map for adjusting the ratio to provide a system for reducing transient and steady state NOx emissions in the exhaust gases of a vehicle powered by a diesel fueled, internal combustion engine which includes a reducing catalytic

converter downstream of the engine having a plurality of channels with a reducing catalyst deposited over a portion of the washcoat surface as taught by Roth.

6. **Claims 50-54** are rejected under 35 U.S.C. 103(a) as being unpatentable over Matros (US Patent No.:6,314,722 B1) and further support of evidence over (NPL: "The role of acid sites in cobalt zeolite catalysts for selective catalytic reduction of NOx", by Miller et al, Catalysis Leners 51 (1998) pages 15-22) in view of Muraki et al (JP Publication No.: 05-96131, English translation).

As per Claims 50 and 54, Matros teaches method and apparatus for emission control as described above but does not mention contacting the exhaust gas with an oxidation catalyst comprising at least one platinum group metal, wherein the NO_2 decomposition catalyst is disposed downstream of the oxidation catalyst.

However, Muraki teaches to reduce roadside NO_2 pollution in the cases of using noble metal catalyst for exhaust gas purification in lean burn-engine where the oxidation catalyst comprises Pt or Pd upstream of catalyst in which NO_2 is decomposed to NO (page 2 lines 10-24).

It would have been obvious to one of the ordinary skill in the art at the time of invention to modify the method of Matros to include the oxidation catalyst containing Pt or Pd for effective means for lowering roadside NO_2 pollution in the case where a three-way catalyst is employed in a lean burn gasoline engine or diesel engine as taught by Muraki.

As per Claim 51, Combination of Matros and Muraki teaches the particulate filer disposed between the oxidation catalyst and the NO_2 decomposition catalyst.

As per Claim 52, Combination of Matros and Muraki teach wherein NO_2decomposition catalyst is disposed on a downstream end of the filter.

As per Claim 53, Matros mention injecting reductant into exhaust system and Muraki teaches NO_2 decomposition catalyst and oxidation catalyst but does not expressively mention injecting upstream of the NO_2 and downstream of oxidation catalyst but it would have been obvious to inject upstream of NO_2, otherwise reductant would not be available for the desired reduction of NO_2 to NO in the NO_2 decomposition catalyst and further it would be obvious that reductant is added downstream from oxidation catalyst because the reductant would otherwise be reduced by the oxidation catalyst and similarly not be available for the reduction of NO_2 to NO.

7. **Claims 43-45, 47 and 49** are rejected under 35 U.S.C. 103(a) as being unpatentable over Obayashi et al (JP62-163731, English translation).

As per Claims 43 and 44, Obayashi teaches a method for decomposing NO_2 to NO which can be applied in exhaust gas of a diesel internal combustion engine (page 2 line 34). In the method oxygen containing hydrocarbon is added to the exhaust gas (page 2 lines 10-13) while in the example, ratio of oxygen containing hydrocarbon (CH_3OH, HCOOH and HCHO respectively) to nitrogen oxides (NO_2 + NO) of 0.70, 0.71, 0.72 and 1.00 respectively are adjusted (Tables 1-4, encompasses the claimed range of 0.1-2). Further the gas mixture is contacted with a catalyst which in example 2 is TiO_2-WO_3-

V_2O_5 where this compound is solid acid (considered as acidic refractory oxide which is tungsten-doped titanium oxide). Obayashi does not expressively mention that passing the effluent gas from the contacting step to atmosphere but it would have been obvious to one of the ordinary skill in the art at the time of invention that following the exhaust gas purification, the effluent gas is passed to the atmosphere so that the NOx in the exhaust gas is decomposed into harmless nitrogen and water as taught by Obayashi.

As per Claim 45, Obayashi teaches step of adjusting the ratio of C1 hydrocarbon to NOx is carried out at 250, 300, 350°C respectively in example 2 (encompassed claimed range from about 250-500° C)

As per Claim 47, Obayashi teaches step of adjusting the C1 HC:NOx ratio is effected in response to one or more of the following inputs which is exhaust gas temperature, NO_2 in the exhaust gas (tables 1-4).

As per Claim 49, Obayashi teaches step adjusting the C1 HC: NOx ratio comprises at least on of injecting reductant into the exhaust gas.

8. **Claims 43-47 and 49** are rejected under 35 U.S.C. 103(a) as being unpatentable over Li et al (European Patent No.: 0582743A1).

As per Claims 43 and 44, Li teaches catalystic reduction of NOx and carbon monoxide using methane in the presence of oxygen where total amount of methane to nitrogen oxides expressed as ratio is greater than 0.1, more preferably between 0.1 to 400 in the combustion of the desired fuel (considered adjusting ratio, page 6 lines 5-20). Further Li teaches contacting the combustion product containing NOx and oxides of carbon with

desired amount of methane and oxygen in the presence of metal exchanged natural or synthetic crystalline zeolites (considered contacting gas mixtures with catalyst consisting of zeolites, page 6 lines 40-44, page 8 lines 35-39). Li does not expressively mention that passing the effluent gas from the contacting step to atmosphere but it would have been obvious to one of the ordinary skill in the art at the time of invention that following the exhaust gas purification, the effluent gas is passed to the atmosphere since the process utilizes a unique and unobvious combination of catalyst namely metal exchanged crystalline zeolites and a novel reducing agent, methane to yield a process which is capable of simultaneously removing NOx and carbon monoxide from oxygen-containing combustion products as taught by Li.

As per Claim 45, Li teaches step of adjusting the ratio of C1 hydrocarbon to NOx is carried out at 250-700°C (encompassed claimed range from about 250-500° C, page 8 lines 26-30).

As per Claim 46, Li teaches ZSM-5 zeolites (page 6 lines 51-53).

As per Claim 47, Li teaches step of adjusting the C1 HC:NOx ratio is effected in response to one or more of the following inputs which is exhaust gas temperature, NO_2 in the exhaust gas.

As per Claim 49, Li teaches step adjusting the C1 HC: NOx ratio comprises at least on of injecting reductant into the exhaust gas, adjusting air to fuel ratio.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SMITA PATEL whose telephone number is (571)270-5837. The examiner can normally be reached on Monday-Thursday, 8:00-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Melvin Curtis Mayes can be reached on 571-272-1234. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

SP, AU1732
02/23/2011

/Melvin Curtis Mayes/
Supervisory Patent Examiner, Art Unit 1732